

Conservation and Reclamation INFORMATION LETTER

Guideline for Wetland Establishment on Reclaimed Oil Sands Leases

OVERVIEW

Wetlands are an integral part of natural landscapes and will be an integral part of the reclaimed landscapes at oil sands operations.

The *Guideline for Wetland Establishment on Reclaimed Oil Sands Leases* provides an approach to the development of wetlands on reclaimed landscapes in the oil sands region. It was developed by the Oil Sands Wetlands Working Group which had representation from government, industry, consulting, university and aboriginal communities.

This Information Letter provides a brief introduction to the guideline and how it will be used. More details are available in the full document, including its appendices.

The guideline comprises seven main parts (as well as references and a glossary):

1. Introduction
2. Background
3. Objectives of the Guideline for Various Users
4. Wetland Development Approach
5. Performance Assessment
6. Reclamation Certification
7. Research Recommendations

A set of appendices offers further information on natural wetlands in the oil sands region, landscape design considerations, hydrology and vegetation considerations, fish and wildlife considerations, salinity, water quality from drained peatlands, constructed wetlands for water treatment, traditional plants, reclamation research priorities, and

CONRAD research projects (Canadian Oilsands Network for Research and Development).

The concepts and numerical values presented in the document represent the best available information at the time the report was completed. By necessity the guideline will be subject to further review and refinement as new knowledge is gained through research, pilot-scale tests, monitoring and experience with using the guideline. Through adaptive management this new knowledge will be used to improve the process and methods for establishing wetlands at oil sands operations.

An overview of the various parts of the guideline follows:

1. Introduction

The Introduction highlights that wetlands are an important component of the natural landscape in the Athabasca Oil Sands Region. Bogs, fens, and marshes occur throughout the area, with bog and fen peatlands being the characteristic wetland type in the region.

Wetlands are integral components of natural landscapes. They provide diverse habitats and productive environments. Wetlands enhance environmental quality by increasing landscape diversity, providing habitat for a variety of fish and wildlife species, protecting and improving the quality of surface water and groundwater, controlling soil erosion and providing flood control. In addition, wetlands provide important economic resources and heritage values, including values associated with traditional land use.

Oil sands mining results in large-scale, extensive disturbance of natural land-

scapes, including wetlands on these landscapes. Operators must reclaim disturbed land and in this process wetlands are required as an integral part of the reclaimed landscape.

Reclamation activities will be guided and directed by existing policy, legislation and planning initiatives, including: the Report and Recommendations of the Oil Sands End Land Use Committee, the Fort McMurray-Athabasca Integrated Resource Plan, the Recommended Wetland Policy for Alberta, the *Environmental Protection and Enhancement Act* (EPEA), the *Water Act* and the Oil Sands Regional Sustainable Development Strategy.

EPEA requires oil sands operators to reclaim disturbed land to an equivalent land capability that will support the intended end land uses on the reclaimed area. Consideration of the design and requirements of wetlands must be an integral part of mine planning and design, as well as mine closure planning.

The guideline presents an approach to wetland reclamation in terms of:

- planning and design
- development and management
- performance assessment
- reclamation certification

This approach will allow the establishment of ecologically viable wetlands in landscapes impacted by oil sands mining. Managers and technical staff require this information to design and develop wetlands and, subsequently, to evaluate them through performance assessment and certification. The guideline will be used to prepare and review applications for wetlands, to evaluate

performance, and to aid in the certification process once reclamation of the wetland is considered complete. The guideline will also assist the public, in particular aboriginal communities, to understand the function and value of wetlands and to participate in the establishment of wetlands on reclaimed landscapes.

The guideline provides an engineering and biological approach, supported by technical information, for the development of the wetland types that are likely to characterize the post-development landscape at oil sands mines. The guideline does not provide, at the present time, detailed criteria for certification of reclaimed wetlands. It does, however, discuss the framework for certification and provide draft interim reclamation criteria as a starting point for the further development of criteria.

2. Background

The term “wetlands” as used in the guideline means “marshes” and “peatlands” and the connecting watercourses between these wetlands. The document does not address guidelines for creating lakes in the reclaimed landscape; however, the shallow, littoral zones around lakes are considered in the guideline as one of the wetland types in the reclaimed landscape.

The guideline recognizes that surface mining of oil sand leases leads to significant alteration of landscape structure. Therefore, wetland reclamation goals will need to be compatible with conditions in this new landscape. Oil sands mining removes ecosystems on the mined site and alters ecosystems off-site, including the bog/fen ecosystem which dominates much of the wetland habitat in the oil sands region.

The peatlands that will be removed cannot be replaced after mine closure since their development was the result of thousands of years of evolution. In addition, the characteristics of the post-mining landscape will not be conducive to the establishment of peatlands (e.g., changes in salinity). Currently, there are no techniques available to recreate bogs and fens on the reclaimed landscape.

The creation of shallow marshes in the reclaimed landscape is feasible and can be done in a manner that should provide many functions and values comparable to wetlands in the region. The ultimate objective is to provide sustainable, biologically diverse and productive wetlands in the reclaimed landscape. Although created wetlands will be different from pre-development wetlands, they should ensure a continuation of traditional uses as much as possible.

There are a number of guiding principles that are essential to wetland development. These principles highlight:

- recognition of wetland functions
- recognition of wetland values
- the importance of wetlands to aboriginal communities
- the need to conserve wetlands
- the requirement for established wetlands to be sustainable
- the need for proper planning
- the need for practical methods
- the need for adaptive management
- the need for performance assessment and reclamation certification criteria
- recognition that constructed wetlands may exhibit effects from reclamation release waters but will be biologically active and inhabited by a sustainable community of organisms
- the need to promote biological diversity and use native species

The guideline provides an overview of the government policy, regulatory requirements and planning initiatives that relate to wetland reclamation in the oil sands region.

The guideline specifically acknowledges the traditional use of wetlands by aboriginal communities. Wetlands, including both marsh and peatland types, cover a significant portion of the undisturbed landscape in the oil sands region. These wetland areas are extremely important to the regional First Nations and Métis communities.

Aboriginal peoples use wetlands for subsistence hunting, trapping, and food and medicinal plant collection, as well as for spiritual and cultural purposes. The desire and need to maintain their culture is closely linked to the ability to practice traditional activities even if they are not living a completely traditional life style.

The guideline provides discussion on subsistence activities, cultural heritage and traditional use of reclaimed wetlands.

3. Objectives of the Guideline for Various Users

The general objectives of the guideline are to:

- promote understanding of wetland establishment and successful reclamation
- provide for the sharing of knowledge among operators, government, consultants, academic institutions, the public at large and the aboriginal community
- foster the basis for communication among oil sands developers
- prioritize and focus research

In addition, the guideline will meet the needs of managers, technical staff, regulatory agencies and aboriginal communities, as well as local communities and other stakeholders.

4. Wetland Development Approach

The guideline provides the basic development approach for creating a variety of wetland types on a reclaimed landscape. It discusses key functions and values of wetlands, landscape components, the general approach to wetland development, and the establishment of specific wetland types. The format includes tables, flow charts and wetland planning sheets.

The design of wetlands on a reclaimed landscape will be determined by a variety of factors, including wetland features (e.g., hydrology, substrate, habitat), land use at both the wetland and watershed level (e.g., recreation), watershed characteristics (e.g., hydrology) and drainage

regime (e.g., downstream effects). There can be a fair degree of control over some factors (e.g., geometry) while others will have less control (e.g., hydrogeology). The ability to influence the various factors needs to be considered with the most effort directed at parameters that make the most difference and are subject to the most control.

Wetland creation must be an interdisciplinary team effort. It will require a variety of engineering and environmental disciplines (e.g., mine planners and engineers; water management engineers; hydrologists; hydrogeologists; water quality scientists; wetland ecologists; microbiologists; botanists; wildlife, waterfowl and fisheries biologists, etc.), as well as assistance from those with traditional knowledge.

Landscape Components. Wetland planning and design must recognize the interrelationship between the wetland being established and the overall landscape. This requires consideration of the landforms that are created during oil sands mining and the various design factors that operate at a landscape level.

A key point for closure planning is that an integrated final landscape should be conceptually developed at the beginning of the mine planning process. The closure plan will require wetlands as an integral part of the reclaimed landscape. This means that wetlands cannot be designed and developed in isolation from the rest of the landscape. Upland areas, surface drainage systems, and wetlands are all part of an integrated landscape.

The guideline for wetland establishment does not prescribe the overall percentage, type or distribution of wetlands at a particular oil sands operation. These matters are dealt with site specifically through the regulatory approvals operators must obtain and the regional coordinating role provided by the Oil Sands Reclamation Advisory Committee.

The guideline provides tables that outline key landscape issues in wetland planning, including design considerations for:

- watershed configuration
- surface drainage
- sustainability

- slope length, angle, aspect
- soil
- vegetation

General Approach to Wetland Development. The guideline identifies five wetland types, as well as spatial and temporal factors in wetland establishment. The five types are:

1. *altered wetlands:* onsite and offsite wetlands not directly removed by mining but potentially affected; conservation and mitigation measures may be needed in some instances;
2. *opportunistic wetlands:* wetlands that are not formally planned but arise in the landscape; they can provide functions related to habitat, flood control or water quality improvement;
3. *constructed wetlands:* wetlands designed on the landscape for specific primary functions such as flood control, water quality improvement, or habitat;
4. *vegetated watercourses:* wetlands designed as vegetated channels on the reclaimed landscape for the purpose of conveying water to wetlands, between wetlands, and offsite; they provide valuable riparian habitat;
5. *littoral zones:* wetlands designed along the shores of end pit lakes; they can enhance habitat, provide shoreline protection, and improve water quality.

The guideline discusses key design issues that apply to any wetland. The issues include hydrology; physical, biological, and chemical, characteristics; nutrients; and traditional use. Tables are provided that discuss specific factors within each issue, their importance or relevance, and design considerations for wetland planning.

Establishment of Specific Wetland Types. The guideline provides a wetland management flow chart as an overview and guide to the establishment of the five wetland types. To facilitate wetland design, the following information is presented in sequence for each type of wetland:

1. general description to provide an overview, rationale and comments on the wetland type;
2. development flow chart to outline the design and implementation process;
3. key issues checklist and selected design recommendations to be considered in wetland planning;
4. development approach sheet to provide a form that can be used to design the wetland.

The development approach used in this guideline establishes the principal function required for each wetland type as the basic guide for wetland development. It does not provide detailed construction designs but rather provides a framework and supporting technical information that can be used by wetland planners.

5. Performance Assessment

Performance assessment evaluates the establishment and development of wetlands on reclaimed areas. Performance assessment, as used in this guideline, means the monitoring of physical, chemical, and biological factors and the evaluation of predicted performance or target values with observed performance and trends, as well as draft interim reclamation criteria

Specific performance assessment criteria have not been specified at the present time since target values and reclamation criteria require further development. However, Section 6 of the guideline (Reclamation Certification) provides an overview of general interim reclamation criteria.

The guideline provides an initial framework for performance assessment based:

1. key issues (i.e., hydrological, physical, biological, chemical);
2. performance indicators;
3. measurement endpoints;
4. performance assessment targets;
5. potential cause of failures;
6. prevention of failures through initial design;
7. mitigation of failures (if they occur) through adaptive management.

Although performance assessment and reclamation criteria require further development, wetlands will typically be monitored for a number of parameters in order to characterize the status of the wetland and to provide trend evaluation to determine if conditions are improving or trending to acceptable targets. The guideline provides a list of suggested parameters for monitoring. The specifics of any monitoring program will need to consider the wetland type, as well as the objectives and methods of the program (i.e., sampling methods, locations, frequency).

6. Reclamation Certification

The guideline outlines the process and general information requirements for reclamation certification.

In the case of wetlands on the reclaimed landscape, specific criteria have not yet been developed; however, draft interim reclamation criteria are provided to give general guidance on the desired characteristics of the reclaimed landscape in relation to wetlands. Government, industry and the public will continue to work toward the further development of criteria for wetlands.

The creation of wetlands on reclaimed landscapes must recognize that a period of time will be required to establish them. The establishment period is expected to be in the order of 10 to 15 years. At that point, the system should be set on a path of ecological succession and development and be "free to evolve." Wetland systems, including watercourses, should not require long-term maintenance and management.

The draft interim reclamation criteria discuss landscape, soil and vegetation factors that should be addressed in reclamation planning and certification of wetlands.

7. Recommendations and Priorities for Research

The guideline provides a number of recommendations to advance the framework for wetland establishment and the scientific knowledge base. The recommendations identify a number of potential research projects. Issues associated with the establishment of wetlands on consolidated or composite tails (CT deposits) were identified as the highest priority for research. This included matters related to water chemistry, biology, hydrology, and traditional land use.

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